Instruction Manual

MODEL 80E-10/AN

VOLTAGE DIVIDER

FLUKE

ELECTRONICS FOR INDUSTRY
INSTRUMENTS / COMPONENTS

JOHN FLUKE MFG. CO., INC.

P.O. Box 7428 Seattle, Washington 98133

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MODEL 80E-10/AN

VOLTAGE DIVIDER

80E-10/AN Serial no. 737 ~~and above~~

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ADDENDA

FLUKE MODEL 80E-10/AN VOLTAGE DIVIDER

With the exception of information contained in this addenda, all of the operation and service data in the attached manual applies to the 80E-10/AN.

The 80E-10/AN is an intergral part of the Fluke Model 7180A Measurement System. In addition, the Model 80E-10/AN will operate from plus 4°C (39°F) to plus 40°C (104°F) with a relative humidity of 0 to 90% and at an altitude from 0 to 10,000 feet above sea level.

ADDENDUM TO

SECTION II OPERATING INSTRUCTIONS

HIGH VOLTAGE POWER SUPPLIES AND VOLTAGE DIVIDERS

1. Coaxial cables used to connect the instrument to a load are not provided by John Fluke Mfg. Co., Inc. Procurement of cables and the assembly of mating cable connectors must be carefully undertaken to insure safty of personnel.

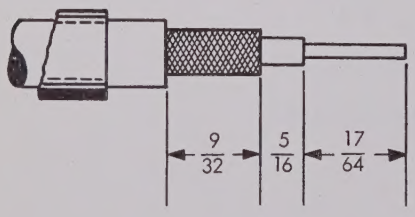
WARNING!

Extreme care should be exercised when utilizing high voltage conductors and connectors. Improper assembly of cable connectors or careless use of high voltage equipment may expose personnel to voltage of lethal magnitude.

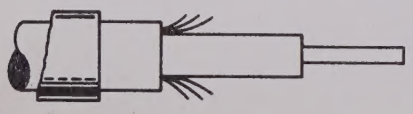
2. General instructions are provided herein for the assembly of two types of cable connectors issued as an accessory item with John Fluke instruments. Additional information on the assembly of these connectors, or on other types of connectors considered for use with the instrument, may be obtained from the cable or connector vending agency.

3. DAGE TYPE 486-1 CONNECTOR ASSEMBLY.

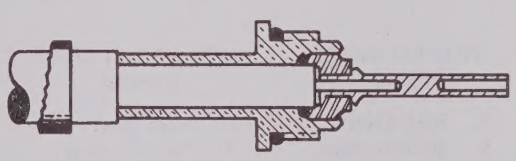
a. Cut cable off square on end. Slide outer sleeve over cable and slide back out of way. Trim cable to dim. shown being careful not to nick center conductor or braid. Tin dip center conductor. Remove all excess solder.



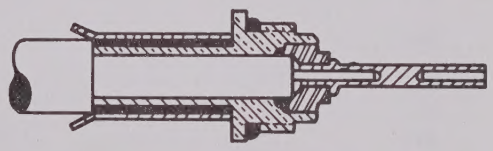
b. Rotate dielectric to slightly flare braid.



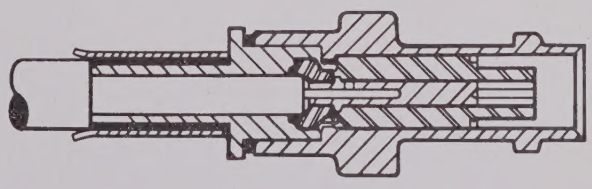
c. Push cable into nut sub-assembly until the center conductor is visible thru hole in contact. Soft solder center conductor thru hole in contact. Remove excess solder. Fold braid down over back end tube of nut. Trim excess braid if necessary.



d. Slide outer sleeves over braid until it is flush against back of nut. Crimp as close to nut as possible using proper crimping tool.



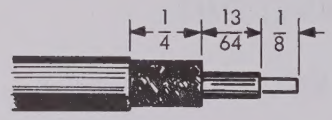
e. Insert finished cable assy. into body either jack or plug and tighten by rotating body. Do not rotate nut sub-assembly.



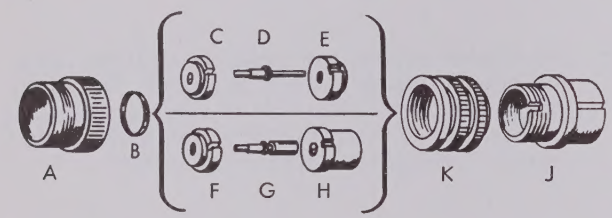
4. AMPHENOL MS 3106A CONNECTOR ASSEMBLY.

a. Strip cable jacket, braid, and dielectric to dimensions shown. All cuts are to be sharp and square. Do not nick braid, dielectric, and center conductor. Tinning of center conductor is not necessary if con-

tact is to be crimped. For solder method, tin center conductor avoiding excessive heat.



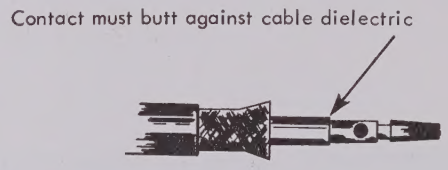
b. Disassemble connector by removing the back shell and retainer ring.



WITH PIN INSERT (Male)		WITH SOCKET INSERT (Female)	
A	Back Shell	A	Back Shell
B	Retainer Ring	B	Retainer Ring
C	Pin Rear Insert	F	Socket Rear Insert
D	Pin Contact	G	Socket Contact
E	Pin Front Insert	H	Socket Front Insert
J	Front Shell	J	Front Shell
K	Coupling Ring	K	Coupling Ring

c. Insert cable thru clamp MS 3057A and rear components of connector. Place the cable center conductor into the socket contact.

d. Soft solder contact to cable center conductor. Do not get any solder on outside surfaces of contact. Avoid excessive heat to prevent swelling or dielectric.



e. Provide a connection from the cable shield to the securing bolt of the cable clamp. The connecting copper wire should be approximately 5 inches long and size 14 or larger in diameter. A terminal lug should be used to connect the wire to the clamp. The wire should be carefully soldered to the shield, taking care not to damage the insulation of the cable. Loose ends of the shield should be clipped off to prevent shorting the center conductor or contact to the shield.

f. Assemble the cable connector by placing the contact into the socket front insert, then coupling the back shell to the front shell in the reverse of the disassembly procedure.

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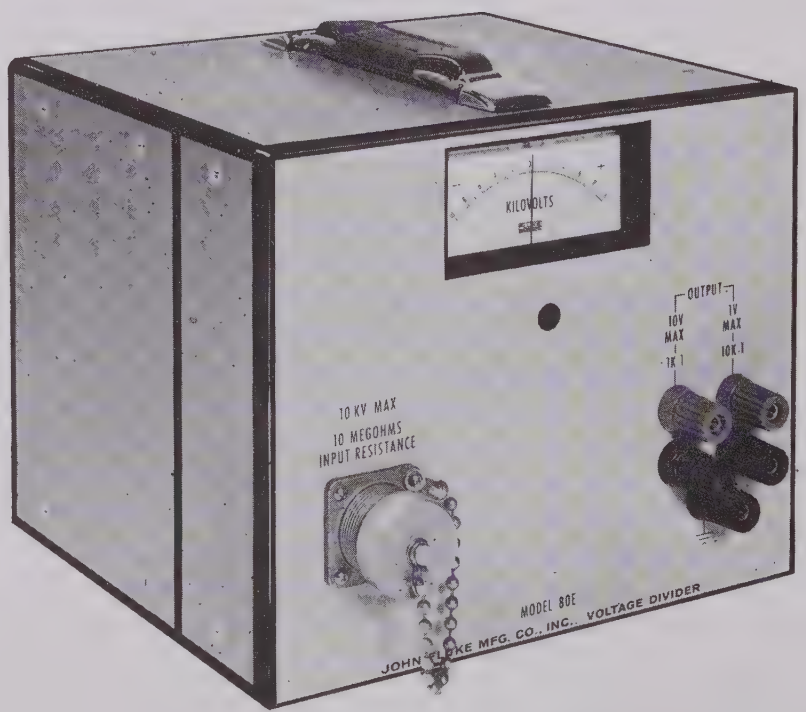


MODEL 80E VOLTAGE DIVIDER

SECTION I

INTRODUCTION AND SPECIFICATIONS

1-1. INTRODUCTION

1-2. The Model 80E Voltage Dividers extend the measuring range of Fluke differential voltmeters. The Model 80E-10 has a maximum input voltage of 10KV. The Model 80E-5 has a maximum input voltage of 5KV. Other input voltages are available on request. Both 10V and 1V output terminals are provided, which permit use of the 80E with Fluke differential voltmeters, or a null-type potentiometer.

1-3. A center zero panel meter permits observation of the approximate magnitude and polarity of the unknown voltage. In order to ensure maximum accuracy and long life, properly aged, wirewound resistors, having a very low temperature coefficient, are used throughout the instrument. The case of the instrument is suitable for either bench use or rack mounting.

1-4. This instrument has been thoroughly checked and tested before being shipped from the factory. Immediately after receiving the instrument, carefully inspect for any damage which may have occurred during transit. If any damage is noted, refer to the instructions outlined in the back of this manual.

1-5. SPECIFICATIONS

1-6. ELECTRICAL

ACCURACY: ±0.01% for both division ratios over a temperature range from 18° C to 28° C and for any input voltage up to rated maximum. Derate at 2 ppm/° C outside this temperature range to 0° C and 50° C.

STABILITY OF DIVISION RATIO: ±0.01% per year (recalibrated by internal adjustment).

METER: Center zero panel meter for indicating approximate magnitude and polarity of unknown high voltage.

1-7. MECHANICAL

INPUT CONNECTOR: MS3102A-18-16S on front panel (mating connector supplied).

OUTPUT CONNECTORS: Two binding posts on 3/4" centers for each of two outputs. One side of each output is common to chassis. Separate binding post for grounding case. All output connectors located on front of instrument.

TEMPERATURE RANGE:
0° C to 50° C (32° F to 122° F) operating
-35° C to 70° C (-31° F to 158° F) storage

HUMIDITY:
0 to 80% (to 28° C)
0 to 60% (to 50° C)

ALTITUDE:
0 to 10,000 feet operating
0 to 50,000 feet non-operating

VIBRATION:
MIL-T-945A.

SHOCK: Meets half sine (20g's, 11 milliseconds) shock and bench handling requirements of MIL-E-4970A.

SIZE:
7" high x 8-1/2" wide x 8" deep.

WEIGHT: Approximately 6 pounds.

Model	Division Ratio		Maximum Input	Current Drawn at Maximum Input	Total Input Resistance
	10V Max	1V Max			
80E-5	500:1	5,000:1	5 KV	1 ma	5 Meg
80E-10	1000:1	10,000:1	10 KV	1 ma	10 Meg

SECTION II

OPERATING INSTRUCTIONS

2-1. OPERATING PROCEDURE

a. Connect the ground side of the voltage to be measured to the ground terminal on the front panel. Please note that the shell of the large input connector is also connected to chassis ground.

b. Connect the voltage to be measured to the large input connector.

c. Connect a Fluke 800 series differential voltmeter to either set of output terminals. Voltages marked by the OUTPUT terminals (10V and 1V) refer to the output voltage at maximum indicated input.

d. Null the voltmeter to indicate the magnitude of the unknown voltage.

e. If desired, instead of using the Fluke voltmeter in step c, a Leeds & Northrup Type K-3 Potentiometer may be connected to the 1V OUTPUT terminal, and adjusted to indicate the unknown voltage.

SECTION III

THEORY OF OPERATION

3-1. THEORY OF OPERATION

3-2. The 80E is a standard type of potentiometric voltage divider. Specified accuracy of the division ratio is obtained only when the instrument connected to the output terminals of the 80E has infinite input impedance. A voltmeter having 10 megohms input resistance will "load" the 10V output of the divider, causing an error of approximately 0.1%. Fluke differential voltmeters present infinite input impedance to the voltage divider at null, and consequently, cause no loading error.

3-3. Resistors used in the 80E are precision wirewound units having a low temperature coefficient, which promotes instrument accuracy and stability.

3-4. The overall accuracy of the panel meter, including the effects of series resistance, is approximately 3% of full scale. The meter is useful for indicating the approximate magnitude and polarity of the unknown voltage.

SECTION IV

MAINTENANCE

4-1. INTRODUCTION

4-2. The Model 80E Voltage Divider requires a minimum of maintenance. Occasionally, dust should be removed from the instrument by clean, dry, pressurized air. The front panel connectors may be cleaned using anhydrous alcohol. If the circuit boards require cleaning, they can also be cleaned with anhydrous alcohol.

4-2. TROUBLESHOOTING

4-3. The following two items are the only usual sources of trouble in the 80E:

a. Instability of the output voltage, which is usually caused by a short in one or more resistors.

b. Output voltage out-of-tolerance, which is usually caused by:

(1) Dirty output connectors.
(2) Dusty printed circuit boards.
(3) A change in value of a resistor.

4-4. The remedy, as suggested by the preceeding paragraph, is to clean the dusty or dirty surface, and/or replace the defective resistor.

4-5. CALIBRATION OF 80E-10

4-6. The division ratio accuracy of the 80E should be checked approximately every six months. The equipment required for calibration is listed in Figure 4-1.

NOTE

Full input voltage should be applied to the 80E for a minimum of 30 minutes prior to calibration.

a. CALIBRATION OF IV OUTPUT

(1) Connect the positive output terminal of the 301E to the 30V terminal of the 9700A and to the 10V OUTPUT terminal of the 80E. The connecting leads must be equal in length.

(2) Connect the 840A galvanometer between the 3V terminal of the 9700A and the 1V OUTPUT terminal of the 80E. Set the 840A to the 300-0-300 nanoampere range.

(3) Set the output of the 301E to 10V.

(4) Adjust R3, located on the calibration board, to null the 840A. As null is approached, the 840A may be set to a more sensitive range.

b. METER CALIBRATION

(1) Disconnect the Model 301E, and connect the positive output of a Fluke Model 410A to the large input connector of the 80E.

(2) Set the 410A for 10KV output.

(3) Adjust R4 for full-scale deflection of the panel meter.

c. CALIBRATION OF 10V OUTPUT

(1) Connect the positive output of the 410A to the 1500V terminal of the 9700A and to the 80E input connector. The connecting leads must be equal in length.

EQUIPMENT	SPECIFICATIONS
DC Power Supplies, Fluke Models 301E and 410A or equivalent.	Must provide stable outputs of 10V, and up to 10KV, respectively.
Galvanometer, Fluke Model 840A.	Null Detector. Sensitivities of 2 na per division and 20 na per division.
Volt Box, Sensitive Research, Type 9700A or equivalent.	Division ratios of 1,000 to 1 and 10,000 to 1. (500 to 1 and 5,000 to 1 for the 80E-5).

Figure 4-1. EQUIPMENT REQUIRED FOR CALIBRATION

(2) Connect the 840A between the 1.5V terminal of the 9700A and the 10V OUTPUT terminal of the 80E. Set the 840A to the 3-0-3 microampere range.

(3) Set the 410A for 750V output.

(4) Adjust R5, and then R6, to null the 840A. As null is approached, the 840A may be set to more sensitive ranges. If R5 and R6 do not provide sufficient resistance, the jumpers across R7, R8, and/or R9 can be removed.

4-7. CALIBRATION OF 80E-5

NOTE

Full input voltage should be applied to the 80E for a minimum of 30 minutes prior to calibration.

a. CALIBRATION OF IV OUTPUT

(1) Perform the steps indicated in paragraph 4-6a.

b. METER CALIBRATION

(1) Disconnect the Model 301E, and connect the positive output of a Fluke Model 410A to the large input connector of the 80E.

(2) Set the 410A for 5KV output.

(3) Adjust R4 for full-scale deflection of the panel meter.

c. CALIBRATION OF 10V OUTPUT

(1) Connect the positive 410A output terminal to the 1500V terminal of the 9700A and to the input terminal of the 80E-5. The connecting leads must be equal in length.

(2) Connect the 840A between the 3V terminal of the 9700A and the 10V OUTPUT terminal of the 80E. Set the 840A to the 3-0-3 microampere range.

(3) Set the 410A for 750V output.

(4) Adjust R5, and then R6, to null the 840A. As null is approached, the 840A may be set to more sensitive ranges. If R5 and R6 do not provide sufficient resistance, the jumpers across R7, R8, and/or R9 can be removed.

SECTION V

LIST OF REPLACEABLE PARTS

5-1. INTRODUCTION

The following list describes all normally replaceable parts of the Model 80E Voltage Divider. Parts are identified on the list by reference designations from the schematic diagram.

5-2. HOW TO OBTAIN PARTS

a. Most parts are standard components and can be obtained locally. All parts manufactured, altered, or designed by Fluke are designated by an asterisk preceding the Fluke part number. All structural parts and all special parts should be ordered from your local Fluke representative or from the factory.

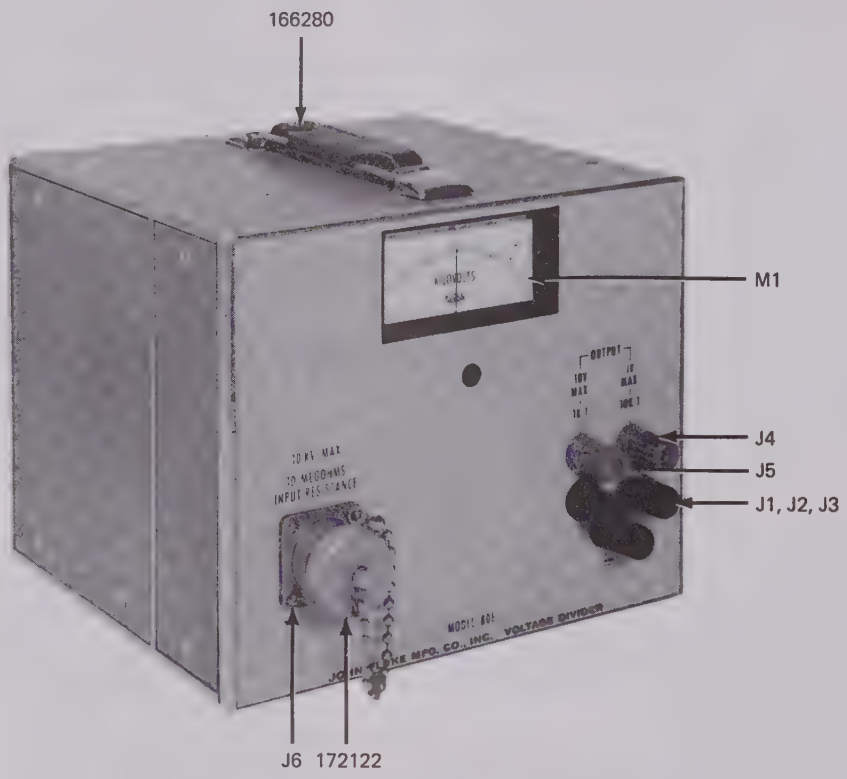
b. When ordering parts always include:

(1) Reference designation, description, and Fluke stock number.

(2) Instrument model and serial number.

c. Most structural parts are not listed in the following chart. To order these, give complete description, function and location of part.

REF DESIG	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
	Final Assembly - Figure 5-1						
	Calibration Assembly - Figure 5-2	1702-167163	89536	1702-167163	1		
R1	Res, ww, 1k, ±0.01%, 1/2w	4707-166579	89536	4707-166579	1		A
R2	Res, ww, 8.998k ±0.01%, 1/2w	4707-166587	89536	4707-166587	1		A
R1, R2	Resistor set, matched	4710-233072	89536	4710-233072	1		B
R3	Res, var, ww, 5Ω ±20%, 1-1/4w	4702-166348	71450	Type 110	1		
R4	Res, var, ww, 200Ω ±20%, 1-1/4w	4702-144766	71450	Type 110	1		
R5	Res, var, ww, 10k ±10%, 1/4w	4702-111641	80294	275-1-103	1		
R6	Res, var, ww, 100Ω ±20%, 1-1/4w	4702-112797	71450	Type 110	1		
R7, R8, R9	Res, ww, 8k ± 0.02%, 1w	4707-131946	89536	4707-131946	3		
R10	Res, ww, 482k ±0.1%, 1w	4707-166595	89536	4707-166595	1		



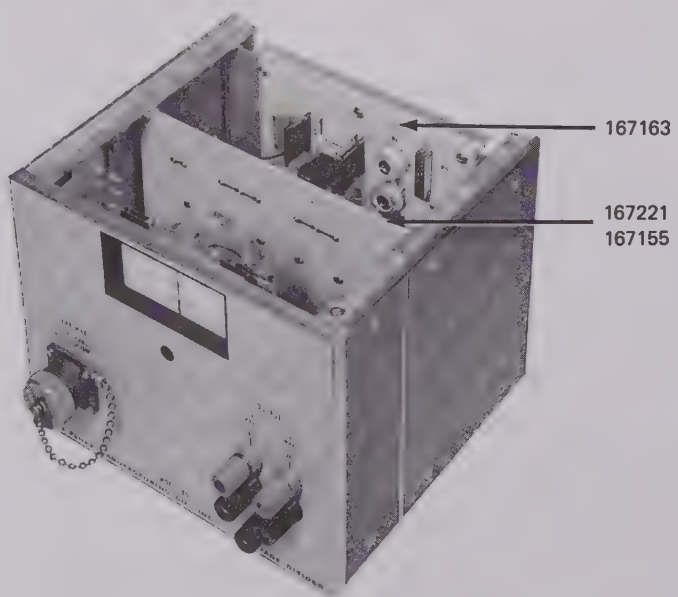


Figure 5-1. FINAL ASSEMBLY

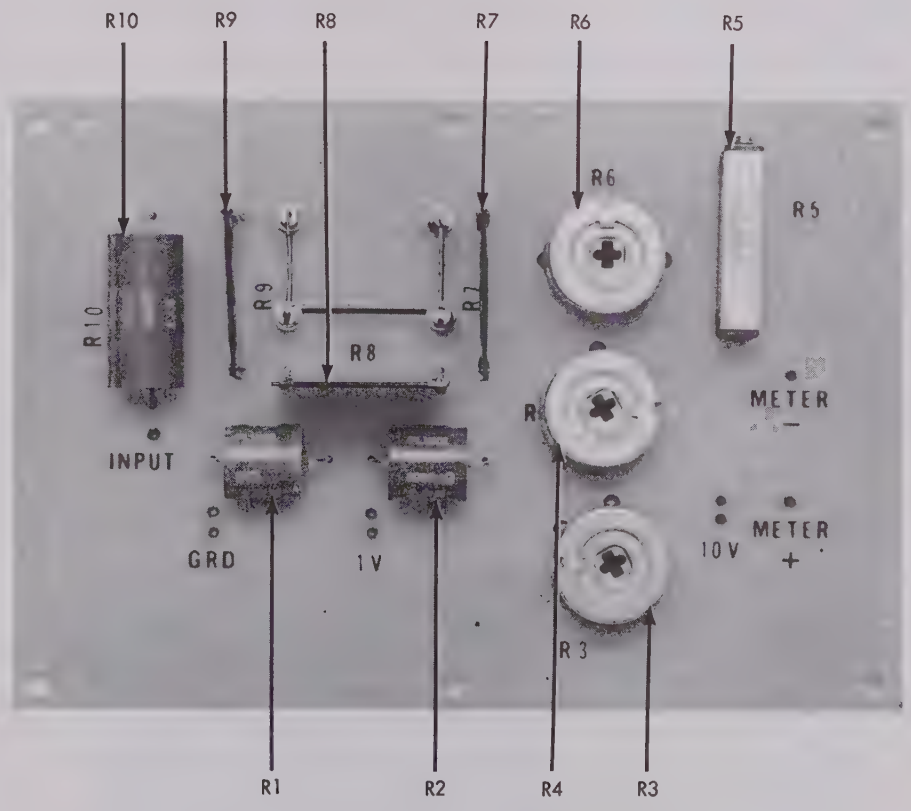


Figure 5-2. CALIBRATION ASSEMBLY

REF DESIG	DESCRIPTION	STOCK NO	MFR	MFR PART NO	TOT QTY	REC QTY	USE CODE
	Driver Assembly - Figure 5-3						
	80E-5 only	1702-167221	89536	1702-167221	1		
	80E-10 only	1702-167155	89536	1702-167155	1		
R11 thru R19	Res, ww, 500k ±0.1%, 1w (80E-5 only) (R11/R12, R13/R14, R15/R16, R17/R18 must be replaced in pairs.) (R11 thru R19 may be ordered as a set, part number 4710-223685.)	4707-192773	89536	4707-192773	9		
R11 thru R29	Res, ww, 500k ±0.1%, 1w (80E-10 only) (R11/R12, R13/R14, R15/R16, etc. must be replaced in pairs.) (R11 thru R29 may be ordered as a set, part number 4710-223701.)	4707-192773	89536	4707-192773	19		
J1, J2 J3	Binding post, black	2811-142984	58474	DF31BC	3		
J4, J5	Binding post, red	2811-142976	58474	DF31RC	2		
J6	Connector, high voltage	2104-208819	02660	MS3102A-18-16P	1		
M1	Meter, 1-0-1 ma	2901-167262	89536	2901-167262	1		
	Connector cap	3155-172122	89536	3155-172122	1		
	Mating connector (not illustrated)	2104-208827	02660	NS3106A-18-16S	1		
	Rubber supports	2819-103309	77969	9102-W	4		
	Handle, 4 inch	2404-166280	12136	919-415-173	1		
	Cable clamp (AN3057-10)	2104-100149	02660	AN3057-10	1		

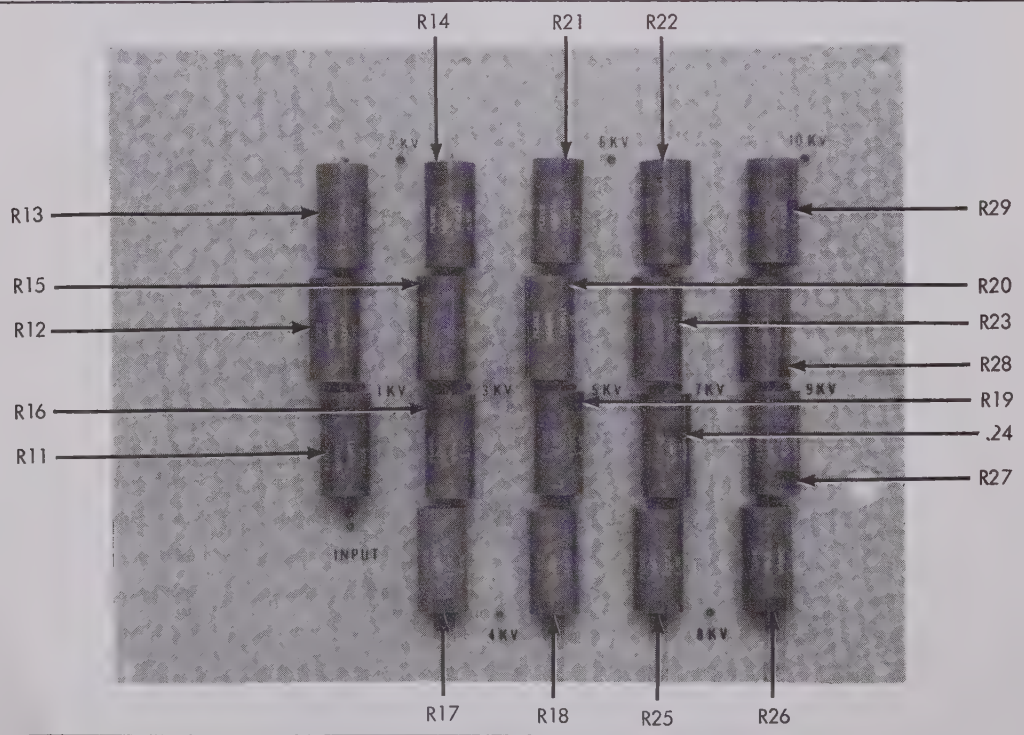


Figure 5-3. DIVIDER ASSEMBLY

5-3. USE CODE EFFECTIVITY

The following list of use codes is intended to allow the customer to determine the effectivity of all replaceable parts. All parts with no code are used on all instruments with serial numbers above 123. New codes will be added as necessary.

USE CODE	EFFECTIVITY
No Code	Model 80E serial number 123 and on
A	Model 80E serial number 123 to 459
B	Model 80E serial number 460 and on

APPENDIX A

FEDERAL SUPPLY CODE FOR MANUFACTURERS

A-1. CODE TO NAME

A-2. The following five-digit code numbers are listed in numerical sequence along with the manufacturer's name and address to which the code has been assigned. The Federal Supply Code has been taken from Cataloging Handbook H 4-2, Code to Name.

00213 Sage Electronics Corp.
Rochester, New York

00327 Welwyn International, Inc.
Westlake, Ohio

00656 Aerovox Corp.
New Bedford, Massachusetts

00779 AMP Inc.
Harrisberg, Pennsylvania

01121 Allen-Bradley Co.
Milwaukee, Wisconsin

01281 TRW Semiconductors
Lawndale, California

01295 Texas Instruments, Inc.
Semiconductor Components Div.
Dallas, Texas

01686 RCL Electronics Inc.
Manchester, New Hampshire

01730 Deleted

01884 Dearborn Electronics Inc.
Orlando, Florida

02114 Ferroxcube Corp.
Saugerties, New York

02606 Replaced by 15801

02660 Amphenol-Borg Elect. Corp.
Broadview, Illinois

02799 Arco Capacitors, Inc.
Los Angeles, California

03614 Replaced by 71400

03651 Replaced by 44655

03797 Eldema Corp.
Compton, California

03877 Transitron Electronic Corp.
Wakefield, Massachusetts

03888 Pyrofilm Resistor Co., Inc.
Cedar Knolls, New Jersey

03911 Clairex Corp.
New York, New York

03980 Muirhead Instruments, Inc.
Mountainside, New Jersey

04009 Arrow Hart and Hegemen
Electronic Company
Hartford, Connecticut

04062 Replaced by 72136

04202 Replaced by 81312

04217 Essex Wire Corp
Wire & Cable Div.
Anaheim, California

04221 Aemco
Div. of Midtex Inc.
Mankato, Minnesota

04645 Replaced by 75376

04713 Motorola Semiconductor Products Inc.
Phoenix, Arizona

05082 Replaced by 94154

05236 Jonathan Mfg. Co.
Fullerton, California

05277 Westinghouse Electric Corp.
Semiconductor Dept.
Youngwood, Pennsylvania

05278 Replaced by 43543

05397 Union Carbide Corp.
Electronics Div.
Cleveland, Ohio

05571 Sprague Electric Co
Pacific Div.
Los Angeles, California

05704 Alac, Inc.
Glendale, California

05820 Wakefield Engineering Ind.
Wakefield, Massachusetts

06001 General Electric Company
Capacitor Department
Irmo, South Carolina

06136 Replaced by 63743

06473 Amphenol Space & Missile Sys.
Chatsworth, California

06555 Beede Electrical Instrument Co.
Penacook, New Hampshire

06739 Electron Corp.
Littletown, Colorado

06743 Clevite Corp.
Cleveland, Ohio

06751 Semcor Div. Components
Phoenix, Arizona

06860 Gould National Batteries Inc.
City of Industry, California

06980 Eitel-McCullough, Inc.
San Carlos, California

07115 Replaced by 14674

07138 Westinghouse Electric Corp
Electronic Tube Div.
Elmira, New York

07263 Fairchild Semiconductor
Div. of Fairchild Camera
& Instrument Corp.
Mountain View, California

07344 Bircher Co., Inc.
Rochester, New York

07792 Lerma Engineering Corp
Northampton, Massachusetts

07910 Continental Device Corp.
Hawthorne, California

08530 Reliance Mica Corp.
Brooklyn, New York

08792 CBS Electronics Semiconductor
Operations-Div. of CBS Inc.
Lowell, Massachusetts

08806 General Electric Co.
Miniature Lamp Dept.
Cleveland, Ohio

08863 Nylomatic Corp.
Norrisville, Pennsylvania

08988 Skottie Electronics Inc.
Archbald, Pennsylvania

09922 Burndy Corp.
Norwalk, Connecticut

11237 Chicago Telephone of Calif. Inc.
South Pasadena, California

11358 CBS Electronics
Div. of CBS Inc.
Newburyport, Massachusetts

11403 Best Products Co.
Chicago, Illinois

11503 Keystone Mfg
Div. of Avis Industrial Corp.
Warren, Michigan

12014 Chicago Rivet & Machine Co.
Bellwood, Illinois

12040 National Semiconductor Corp.
Danburry, Connecticut

12060 Diodes, Inc.
Chatsworth, California

12136 Philadelphia Handle Co.
Camden, New Jersey

12323 Presin Co., Inc.
Shelton, Connecticut

12327 Freeway Washer & Stamping Co.
Cleveland, Ohio

12400 Replaced by 75042

12617 Hamlin Inc.
Lake Mills, Wisconsin

12697 Clarostat Mfg. Co.
Dover, New Hampshire

12749 James Electronics
Chicago, Illinois

12856	Micrometals Sierra Madre, California
12954	Dickson Electronics Corp. Scottsdale, Arizona
13606	Sprague Electric Co. Transistor Div. Concord, New Hampshire
13839	Replaced by 23732
14099	Semtech Corp. Newbury Park, California
14193	California Resistor Corp. Santa Monica, California
14298	American Components, Inc. Conshohocken, Pennsylvania
14655	Cornell-Dubilier Electronics Newark, New Jersey
14674	Corning Glass Works Corning, New York
14752	Electro Cube Inc. San Gabriel, California
14869	Replaced by 96853
15636	Elec-Trol Inc. Northridge, California
15801	Fenwal Electronics Inc. Framingham, Massachusetts
15818	Amelco Semiconductor Div. of Teledyne Inc. Mountain View, California
15849	Useco, Inc. Mt. Vernon, New York
15909	Replaced by 17870
16332	Replaced by 28478
16473	Cambridge Scientific Ind. Inc. Cambridge, Maryland
16742	Paramount Plastics Downey, California
16758	Delco Radio Div. of General Motors Kokomo, Indiana
17069	Circuit Structures Lab. Upland, California
17856	Siliconix, Inc. Sunnyvale, California
17870	Daven-Div. of Thomas A. Edison Ind. --McGraw-Edison Co. Manchester, New Hampshire
18083	Deleted
18178	Vactec Inc. Maryland Heights, Missouri
18736	Voltronics Corp. Hanover, New Jersey
19429	Montronics, Inc. Seattle, Washington
19451	Perine Machinery & Supply Co. Seattle, Washington
19701	Electra Mfg. Co. Independence, Kansas
20584	Enochs Mfg. Co. Indianapolis, Indiana
22767	ITT Semiconductors Div. of ITT Palo Alto, California
23732	Tracor Rockville, Maryland
24248	Southco Div. of South Chester Corp. Lester, Pennsylvania
24655	General Radio Co. West Concord, Massachusetts
25403	Amperex Electronic Corp Semiconductor & Receiving Tube Division Slatersville, Rhode Island
28478	Deltrol Controls Corp. Milwaukee, Wisconsin
28520	Heyman Mfg. Co. Kenilworth, New Jersey
30323	Illinois Tool Works Inc. Chicago, Illinois
33173	General Electric Co. Tube Dept. Owensboro, Kentucky
37942	Mallory, P. R., & Co., Inc. Indianapolis, Indiana
38315	Honeywell Inc. Precision Meter Div. Manchester, New Hampshire
42498	National Company Melrose, Massachusetts
43543	Nytronics Inc. Transformer Co. Div. Alpha, New Jersey
44655	Ohmite Mfg. Co. Skokie, Illinois
49671	Radio Corp. of America New York, New York
49956	Raytheon Company Lexington, Maine
53021	Sangamo Electric Co. Springfield, Illinois
55026	Simpson Electric Company Chicago, Illinois
56289	Sprague Electric Co. North Adams, Massachusetts
58474	Superior Electric Co. Bristol, Connecticut
60399	Torrington Mfg. Co. Torrington, Connecticut
62460	Deleted
63743	Ward Leonard Electric Co. Mount Vernon, New York
64834	West Mfg. Co. San Francisco, California
65092	Weston Instruments Inc. Newark, New Jersey
66150	Winslow Tele-Tronics Inc. Asbury Park, New Jersey
70563	Amperite Company Union City, New Jersey
70903	Belden Mfg. Co. Chicago, Illinois
71002	Birnbach Radio Co., Inc. New York, New York
71400	Bussmann Mfg. Div. of McGraw-Edison Co. St. Louis, Missouri
71450	CTS Corp. Elkhart, Indiana
71468	ITT Cannon Electric Inc. Los Angeles, California
71482	Clare, C P & Co. Chicago, Illinois
71590	Centralab Div. of Globe Union Inc. Milwaukee, Wisconsin
71707	Coto Coil Co., Inc. Providence, Rhode Island
71744	Chicago Miniature Lamp Works Chicago, Illinois
71785	Cinch Mfg. Co. & Howard B. Jones Div. Chicago, Illinois
72005	Driver, Wilbur B., Co. Newark, New Jersey
72092	Replaced by 06980
72136	Electro Motive Mfg. Co. Willimantic, Connecticut
72259	Nytronics Inc. Berkeley Heights, New Jersey
72354	Deleted
72619	Dialight Corp Brooklyn, New York
72653	G. C. Electronics Rockford, Illinois
72665	Replaced by 90303
72794	Dzus Fastener Co., Inc. West Islip, New York
72928	Gudeman Co. Chicago, Illinois
72982	Erie Tech. Products Inc. Erie, Pennsylvania
73138	Beckman Instruments Inc. Helipot Division Fullerton, California
73293	Hughes Aircraft Co. Electron Dynamics Div. Newport Beach, California
73445	Amperex Electronic Corp. Hicksville, New York
73559	Carling Electric Inc. Hartford, Connecticut
73586	Circle F Industries Trenton, New Jersey
73734	Federal Screw Products, Inc. Chicago, Illinois
73743	Fischer Special Mfg. Co. Cincinnati, Ohio
73899	JFD Electronics Co. Brooklyn, New York
73949	Guardian Electric Mfg. Co. Chicago, Illinois
74199	Quam Nichols Co. Chicago, Illinois
74217	Radio Switch Corp. Marlboro, New Jersey
74276	Signalite Inc. Neptune, New Jersey
74306	Piezo Crystal Co. Carlisle, Pennsylvania
74542	Hoyt Elect. Instr. Works Penacook, New Hampshire
74970	Johnson, E. F., Co. Waseca, Minnesota
75042	IRC Inc. Philadelphia, Pennsylvania
75376	Kurz-Kasch, Inc. Dayton, Ohio
75382	Kulka Electric Corp. Mt. Vernon, New York
75915	Littleluse Inc. Des Plaines, Illinois
76854	Oak Mfg. Co. Crystal Lake, Illinois
77342	Potter & Brumfield Div. of Amer. Machine & Foundry Princeton, Indiana
77969	Rubbercraft Corp. of Calif. LTD. Torrance, California

78189 Shakeproof
Div. of Illinois Tool Works
Elgin, Illinois

78277 Sigma Instruments, Inc.
South Braintree, Massachusetts

78488 Stackpole Carbon Co.
St. Marys, Pennsylvania

78553 Tinnerman Products
Cleveland, Ohio

79136 Waldes Kohinoor Inc.
Long Island City, New York

79497 Western Rubber Company
Goshen, Indiana

79963 Zierick Mfg. Corp.
New Rochelle, New York

80031 Mepco
Div. of Sessions Clock Co.
Morristown, New Jersey

80145 API Instruments Co.
Chesterland, Ohio

80183 Sprague Products
North Adams, Massachusetts

80294 Bourns Inc.
Riverside, California

80583 Hammarlund Co., Inc.
Mars Hill, North Carolina

80640 Stevens, Arnold Inc.
Boston, Massachusetts

81073 Grayhill Inc.
La Grange, Illinois

81312 Winchester Electronics
Div. of Litton Industries
Oakville, Connecticut

81439 Therm-O-Disc Inc.
Mansfield, Ohio

81483 International Rectifier Corp.
El Segundo, California

81590 Korry Mfg. Co.
Seattle, Washington

82376 Deleted

82389 Switchcraft Inc.
Chicago, Illinois

82415 Price Electric Corp.
Frederick, Maryland

82872 Roanwell Corp.
New York, New York

82877 Rotron Mfg. Co., Inc.
Woodstock, New York

82879 ITT Wire & Cable Div.
Pawtucket, Rhode Island

83003 Varo Inc.
Garland, Texas

83298 Bendix Corp.
Electric Power Division
Eatontown, New Jersey

83330 Smith, Herman H., Inc.
Brooklyn, New York

83478 Rubbercraft Corp. of America
New Haven, Connecticut

83594 Burroughs Corp.
Electronic Components Div.
Plainfield, New Jersey

83740 Union Carbide Corp.
Consumer Products Div.
New York, New York

84171 Arco Electronics, Inc.
Great Neck, New York

84411 TRW
Ogallala, Nebraska

86577 Precision Metal Products
Stoneham, Massachusetts

86684 Radio Corp. of America
Electronic Components & Devices
Harrison, New Jersey

86689 Deleted

87034 Marco-Oak Inc.
Anaheim, California

88419 Use 14655

88690 Replaced by 04217

89536 Fluke, John Mfg. Co., Inc.
Seattle, Washington

89730 Replaced by 08806

90201 Mallory Capacitor Co.
Indianapolis, Indiana

90215 Best Stamp & Mfg. Co.
Kansas City, Missouri

90211 Square D Co.
Chicago, Illinois

90303 Mallory Battery Co.
Tarrytown, New York

91293 Johanson Mfg. Co.
Boonton, New Jersey

91407 Replaced by 58474

91637 Dale Electronics Inc.
Columbus, Nebraska

91662 Elco Corp.
Willow Grove, Pennsylvania

91737 Gremar Mfg. Co., Inc.
Wakefield, Massachusetts

91802 Industrial Devices, Inc.
Edgewater, New Jersey

91836 King's Electronics
Tuckahoe, New York

91929 Honeywell Inc.
Micro Switch Div.
Freeport, Illinois

91934 Miller Electric Co., Inc.
Pawtucket, Rhode Island

93332 Sylvania Electric Products
Semiconductor Products Div.
Woburn, Massachusetts

94145 Replaced by 49956

94154 Tung-Sol
Div. of Wagner Electric Corp.
Newark, New Jersey

95146 Alco Electronics Products Inc.
Lawrence, Massachusetts

95263 Leecraft Mfg. Co.
Long Island City, New York

95264 Replaced by 98278

95275 Vitramon Inc.
Bridgeport, Connecticut

95303 Radio Corp. of America
Solid State & Receiving Tube Div.
Cincinnati, Ohio

95354 Methode Mfg. Corp.
Rolling Meadows, Illinois

95712 Dage Electric Co., Inc.
Franklin, Indiana

95987 Weckesser Co., Inc.
Chicago, Illinois

96733 San Fernando Electric Mfg. Co.
San Fernando, California

96853 Rustrak Instrument Co.
Manchester, New Hampshire

96881 Thomson Industries, Inc.
Manhasset, New York

97540 Master Mobile Mounts
Div. of Whitehall Electronics Corp.
Los Angeles, California

97913 Industrial Electronic Hdware Corp.
New York, New York

97945 White, S. S. Co.
Plastics Div.
New York, New York

97966 Replaced by 11358

98094 Replaced by 49956

98278 Microdot Inc.
Pasadena, California

98291 Sealectro Corp.
Conhex Div
Mamaroneck, New York

98388 Accurate Rubber & Plastics
Culver City, California

98743 Replaced by 12749

98925 Deleted

99120 Plastic Capacitors, Inc.
Chicago, Illinois

99217 Southern Electronics Corp.
Burbank, California

99515 Marshall Industries
Capacitor Div.
Monrovia, California

Revised August 1, 1968
Using H4-1 and H4-2
Dated June , 1968

WARRANTY

The JOHN FLUKE MFG. CO., INC. warrants each instrument manufactured by them to be free from defects in material and workmanship. Their obligation under this Warranty is limited to servicing or adjusting an instrument returned to the factory for that purpose, and to making good at the factory any part or parts thereof; except tubes, fuses, choppers and batteries, which shall, within one year after making delivery to the original purchaser, be returned by the original purchaser with transportation charges prepaid, and which upon their examination shall disclose to their satisfaction to have been thus defective. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at a nominal cost. In this case, an estimate will be submitted before work is started, if requested.

If any fault develops, the following steps should be taken.

1. Notify the John Fluke Mfg. Co., Inc., giving full details of the difficulty, and include the Model number, type number, and serial number. On receipt of this information, service data or shipping instructions will be forwarded to you.

2. On receipt of the shipping instructions, forward the instrument prepaid, and repairs will be made at the factory. If requested, an estimate of the charges will be made before the work begins, provided the instrument is not covered by the Warranty.

SHIPPING

All shipments of John Fluke Mfg. Co., Inc. instruments should be made via Railway Express prepaid. The instrument should be shipped in the original packing carton; or if it is not available, use any suitable container that is rigid. If a substitute container is used, the instrument should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock-absorbing material.

CLAIM FOR DAMAGE IN SHIPMENT

The instrument should be thoroughly inspected immediately upon receipt. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the instrument fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent, and this report should be forwarded to John Fluke Mfg. Co., Inc. Upon receipt of this report you will be advised of the disposition of the equipment for repair or replacement. Include the model number, type number, and serial number when referring to this instrument for any reason.

The John Fluke Mfg. Co., Inc. will be happy to answer all application questions which will enhance your use of this instrument. Please address your requests to:

JOHN FLUKE MFG. CO., INC., P. O. BOX 7428, SEATTLE 33, WASHINGTON

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3322 South Memorial Parkway
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5950 Sixth Ave. South
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Santa Clara, California 95050
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Zip 48227

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1519 Stuyvesant Avenue
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Tel. (513) 298-9964
Zip 45409

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Suite 332
3810 Westheimer
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Mt. Waverley, Vic. Australia 3149

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Tel-Aviv, Israel

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20146 Milano, Italy

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P.O. Box 5014
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2-38 Junkeicho-dori minami-ku
Osaka, Japan

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O'Connor's (Pte.) Limited
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West Malaysia

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Post Office Box 5053
Tilburg, The Netherlands

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P.B. 6688 Rodelokka
Oslo 6, Norway

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Robinson Road
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P.O. Box 3641
Cape Town, So. Africa

K. Baker (Pty.) Ltd.
P.O. Box 2143
Durban, Natal, So. Africa

K. Baker (Pty.) Ltd.
P.O. Box 210
Swaziland, So. Africa

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Bromma, Sweden

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8008 Zurich, Switzerland

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Heighten Trading Co., Ltd.
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30 Patpong Avenue
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Watford, England
WD2-4TT

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Rohde & Schwarz Handels - Gmbh
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Ernst - Reuter - Platz 10
West Germany

Rohde & Schwarz Vertriebs - Gmbh
2000 Hamburg 50
Grosse Bergstrasse 213-217
West Germany

Rohde & Schwarz Vertriebs - Gmbh
7500 Karlsruhe
Kriegsstrasse 39
West Germany

Rohde & Schwarz Vertriebs - Gmbh
8000 Muenchen
Deachauer Strasse 109
West Germany

In Europe contact FLUKE NEDERLAND, N. V., Post Office Box 5053, Tilburg, The Netherlands

List of Factory Authorized Service Centers

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PHOENIX

Arizona Standards Laboratory
4430 N. 19th Ave.
Tel. (602) 264-9351

CALIFORNIA

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Instrument Specialists, Inc.
P. O. Box 39908
2870 Los Feliz Place
Tel. (213) 665-5181
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Ball Brothers Research Corp.
Standardization Laboratory
Tel. (303) 444-5300
TWX: 910-940-3241

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EG & G Standards and Calibration Laboratory
P. O. Box 4339, Station A
933 Bradbury Drive S. E.
Tel. (505) 842-4084

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1001 E. 55th St.
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Linear Standards Laboratory
8207 Millet
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UNITED KINGDOM

Fluke International Corp
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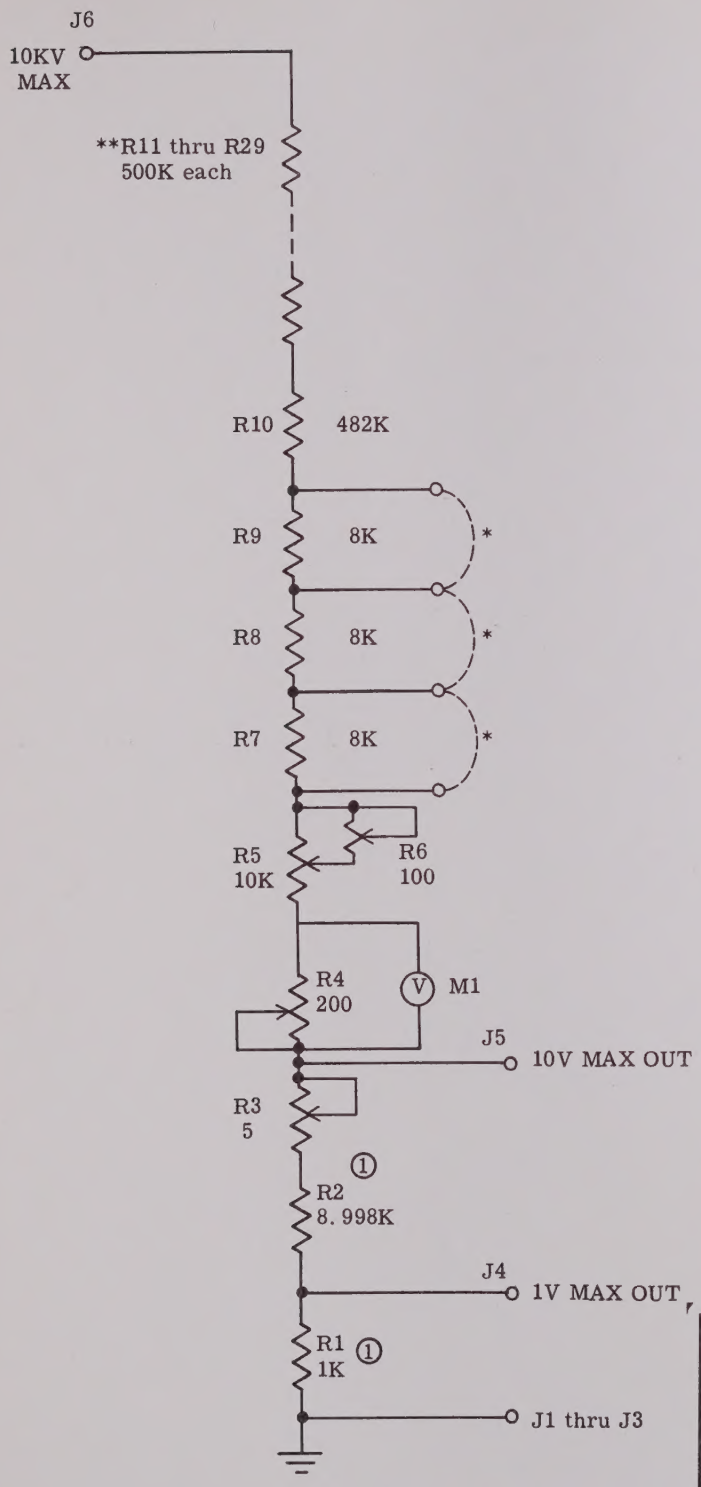
Watford-Herts, England

For information regarding service centers in other foreign locations, contact the nearest Sales and Service Representative in your area.



*Calibration jumper

**Note: R20 thru R29 not used on 80E-5

(1) For Model 80E-5 & 80E-10 serial number 460 and on R1 & R2 changed to matched set

All resistors are in ohms and all capacitors are in microfarads unless otherwise noted.

FUNCTIONAL SCHEMATIC

MODEL 80E-5
MODEL 80E-10

VOLTAGE DIVIDER

MODEL 80E-5	SER. NO. 123 & ON
MODEL 80E-10	SER. NO. 123 & ON

FLUKE JOHN FLUKE MFG. CO., INC.
P.O. Box 7428 Seattle, Washington 98133

MP MASTER
MA34714